TCAS II CHANGE PROPOSAL (CP)

DATE: 11 / 02 / 07 **No.:** **121**

TCAS II Version: **DO-185A (v7)** X **Other (Specify)** _____

MOPS Function Area: **Surveillance** _____ **Display Req'ts** _____ **CRS** X

CAS Pseudocode X **Test Suites** _____ **Other** X

Priority: **URGENT** _____ **Necessary** X **Optional** _____

CP Type: **ERROR** _____ **Enhancement** _____ **Evaluation Request** _____

Editorial (Logic) _____ **Editorial (Text)** X

Description of Problem/Issue:

This change proposal has been generated to document various editorial errors in DO-185A that should be corrected when a new TCAS II MOPS, DO-185B, is generated. It documents those editorial problems that were known to the authors at the time of its issue. In addition, it documents minor non-technical changes to the text of the document. This is done to provide for review and for configuration control of those changes.

Proposed Resolution:

See the attached pages.

References:

1. Spencer, D., Men, H., "Errata for DO-185A", IP-RWG_013, 15 August 2006.
2. Comments on Draft DO-185B Collected on and after the Toulouse RTCA Special Committee 147 Plenary, May-October, 2007.

Requester: Hui Men & Dave Spencer

Organization: Johns Hopkins University Applied Physics Laboratory (JHU/APL) & MIT Lincoln Laboratory (MIT/LL)

DISPOSITION OF CHANGE PROPOSAL (Per RWG):

DATE OF DISPOSITION 12 / 11 / 07

Rejected _____ **Deferred** _____ **[Review Date:** ____ / ____ / ____ **]**

Accepted x **Modified** _____ **Withdrawn** _____

DISPOSITION OF CHANGE:

On Hold _____ **Designing** _____ **Testing** _____ **Done** x **[Date:** 12 / 11 / 07 **]**

Final Approval of Changes:

Signature: Andy Zeitlin, RWG Chair
Date: 12 / 11 / 2007

Editorial and Styling Changes – Regarding DO-185B Volume I

Section 1.1, Introduction, first paragraph

From:

> This document sets forth minimum operational performance standards for Traffic Alert and Collision Avoidance System II (TCAS II) equipment.

To:

> This document sets forth minimum operational performance standards for Traffic Alert and Collision Avoidance System II (TCAS II) equipment. TCAS II is intended to improve air safety by acting as a last-resort method of preventing mid-air collisions or near collisions, between aircraft. By utilizing Secondary Surveillance Radar (SSR) technology, TCAS II equipment operates independently of ground-based aids and air traffic control (ATC). Aircraft equipped with TCAS II have the ability to interrogate airborne transponders to monitor range, bearing, and reported altitude of other aircraft in the vicinity and assess the risk of collision. Non-transponding aircraft are not detected. TCAS II Version 6.0 was first introduced in the United States in 1990 with collision avoidance logic Version 6.0 and later 6.04 and 6.04a. TCAS II Version 7.0 was introduced in the United States and Europe in 2000 and was subsequently mandated by the International Civil Aviation Organization (ICAO) for all commercial turbine-powered transport aircraft worldwide having more than 19 passenger seats or having a maximum take-off weight above 5700 kg. TCAS II is referred to as the Airborne Collision Avoidance System II (ACAS II) in ICAO terminology.
>
> TCAS II provides traffic advisories (TAs) and if warranted, resolution advisories (RAs) in the vertical plane. RAs are indications given to the flight crew recommending maneuvers intended to provide separation from all threats, or restrictions to maneuvers to maintain existing separation. TCAS II operating procedures give RAs priority over ATC clearances and instructions, i.e., flight crews are instructed to follow an RA even when it conflicts with ATC guidance. Controllers have no knowledge of a TCAS RA unless notified by the flight crew via the radio. (RA information is provided by TCAS II to Mode S SSRs, but it is not normally presented to controllers.) Only stall warnings and Ground Proximity Warning System warnings have higher priority than a TCAS RA. Results of United States and European safety studies show that there is a significant safety benefit to be gained from the widespread carriage and operation of TCAS II, specifically, the risk of mid-air collision is reduced by at least a factor of three. Globally, operational experience has shown that TCAS II has significantly improved the safety of flight.

Section 1.8, Glossary
Change the definition of Mode S Discrete Address or Identity and rename it as ICAO 24-bit aircraft address

From:

> Mode S Discrete Address or Identity – A unique 24 bit address assigned to each Mode S equipped aircraft. This allows the Mode S beacon to interrogate one aircraft at a time (by specifying that aircraft's Mode S address in the interrogation).

To:

> ICAO 24-bit aircraft address – A unique 24 bit address assigned to each Mode S equipped aircraft. It is included in Mode S replies and broadcasts in order to uniquely identify the aircraft. It allows Mode S interrogators (SSRs or TCAS II) to interrogate one aircraft at a time by specifying that aircraft's Mode S address in the interrogation.

Replacing "Mode S (discrete) address/ID" with "ICAO 24-bit aircraft address"

Replaced the following instances of "Mode S address", "Mode S discrete address" with "ICAO 24-bit aircraft address" or "ICAO aircraft address":

1. Page ix, Table of Contents, 2.2.7.2.5.3
2. Page xvi, Table of Contents, 2.4.2.4.3
3. Page 35
4. Page 36
5. Page 61
6. Page 68
7. Page 69
8. Page 75
9. Page 80
10. Page 91
11. Page 111
12. Page 113
13. Page 113
14. Page 114
15. Page 120
16. Page 126
17. Page 127
18. Page 128
19. Page 132
20. Page 133
21. Page 135
22. Page 190
23. Page 209
24. Page 212

25. Page 239
26. Page 240
27. Page 242
28. Page 247
29. Page 259
30. Page 261
31. Page 283
32. Page 284
33. Page 285
34. Page 287
35. Page 288
36. Page 347
37. Page 348
38. Page 349
39. Page 351
40. Page 352
41. Page 354
42. Page 355
43. Page 358
44. Page 360
45. Page 361
46. Page 433
47. 499 2 times
48. Page B-3

Note: The labels in Figure 2-11 and 2-12 on pages 136 and 137 are not modified because the figures are non-editable.

Section 2.4.2.1.7.5, Table 2-43

The line in the Intruder column of Table 2-43 that read “112-113” in DO-185A should read “112-114”.

DO-185B Volume I Style Notes and Maintenance Guide

A detailed DO-185B Volume I Style Notes and Maintenance Guide, compiled by David Spencer at MIT/LL and attached as Appendix A, documents the reformatting of DO-185B Volume I. This did not change the text content and in many sections it had little effect on the printed appearance of the text. However, it greatly simplified the different types of formatting used in the document and should ease future maintenance. Where the appearance did change the objective was to have a more uniform appearance throughout the document.

One change was made that might be considered substantive. In DO-185A, sub-paragraphs 2.2.3.9.3.2.3 through 2.2.3.9.3.2.5, 2.4.2.1.2.1, 2.4.2.1.6.2, 2.4.2.1.8.2, 2.4.2.1.10.2, 2.4.2.3.1.1.5, and 2.4.2.3.1.7.1.2 were further subdivided into parts a, b, c,

etc. In some cases these were further divided into a.1, a.2, etc. The List a. style was used to format these sections, as if they were lists of items, even though they went on for several pages. The List 1. style was used where a second level of subdivision was used. These styles both involve indenting the text beyond the normal 1-inch indentation of Paragraph style, and this required special formatting for those paragraphs. In DO-185B these subparts have all been reformatted using standard Heading 7 or Heading 8 or Heading 9 styles, and the paragraphs contained within these sections formatted like the rest of the document. All references to these paragraphs were changed to reference the new numbering. They all now show up in the Table of Contents.

Editorial and Styling Changes – Regarding DO-185B Volume II

Replacing "Mode S (discrete) address/ID" with "ICAO 24-bit aircraft address"

A case insensitive text search for key words, "mode s" and "mode_s", identified the following areas needing replacements:

1. Page 17, Interface Coordination_Reply, Description

   From: Mode S address
   To: ICAO aircraft address

2. Page 48, Own_Mode_S_Address$_{v\text{-}48,}$ Description

   From: Mode S address
   To: ICAO aircraft address

3. Page 161, Other_Mode_S_Address$_{v\text{-}161,}$ Description

   From: Mode S address
   To: 24-bit ICAO aircraft address

4. Page 421, Report_Matches$_{m\text{-}421}$, Description

   From: Mode S address, Mode S ID
   To: ICAO aircraft address, ICAO aircraft address

5. Page 575, Threat_ID$_{f\text{-}574}$, Description

   From: Mode S Address
   To: ICAO aircraft address

Note: The names of variables *Own_Mode_S_Address$_{v\text{-}48}$* and *Other_Mode_S_Address$_{v\text{-}161}$*, which appear in the following locations, are not modified because they are also used in the TSIM software. Changing these names would require change the TSIM software, which in turn, requires the re-verification of the test suite.

1. Page xv, Table of Variables, Other_Mode_S_Address
2. Page xvi, Table of Variables, Own_Mode_S_Address
3. Page 4, Other_Mode_S_Address$_{v\text{-}161}$
4. Page 9, Own_Mode_S_Address$_{v\text{-}48}$, Own_Mode_S_ID
5. Page 10, Other_Mode_S_Address$_{v\text{-}161}$
6. Page 17, Mode_S_Address, Other_Mode_S_Address$_{v\text{-}161}$
7. Page 23, Other_Mode_S_Address$_{v\text{-}161}$, Own_Mode_S_Address$_{v\text{-}48}$
8. Page 40, Own_Mode_S_Address$_{v\text{-}48}$

9. Page 158, Other_Mode_S_Address$_{v\text{-}161}$
10. Page 212, Own_Mode_S_Address$_{v\text{-}48}$, Other_Mode_S_Address$_{v\text{-}161}$
11. Page 402, Own_Mode_S_Address$_{v\text{-}48}$, Other_Mode_S_Address$_{v\text{-}161}$
12. Page 421, Other_Mode_S_Address$_{v\text{-}161}$
13. Page 422, Own_Mode_S_Address$_{v\text{-}48}$, Other_Mode_S_Address$_{v\text{-}161}$
14. Page 426, Own_Mode_S_Address$_{v\text{-}48}$, Other_Mode_S_Address$_{v\text{-}161}$
15. Page 443, Own_Mode_S_Address$_{v\text{-}48}$, Other_Mode_S_Address$_{v\text{-}161}$
16. Page 444, Own_Mode_S_Address$_{v\text{-}48}$, Other_Mode_S_Address$_{v\text{-}161}$
17. Page 574, Other_Mode_S_Address$_{v\text{-}161}$
18. Page E-1, Own_Mode_S_Address$_{v\text{-}48}$

Page 426, Abbreviation REVERSAL_SEPARATION_OK

The token "Reversal" that is the argument to the functions Down_Separation and Up_Separation on the second and fourth lines respectively is a constant that indicates the type of modeling to be performed by these functions. It is erroneously shown with subscripts indicating that it refers to the Reversal state machine on page 215. The subscript s-215 should be removed from both instances of Reversal. It might be desirable to use a different name than Reversal for this constant in order to avoid this potential confusion, but that would require changes in other areas of Volume 2.

TABLE OF CONTENTS, TABLE OF FIGURES, TABLE OF STATES, TABLE OF VARIABLES, Page Numbers Attached to the Statecharts Entity Names

The twelve new pages introduced by CP112E and four new pages introduced by CP115 require the entire Table of Contents, Table of Figures, Table of States, and Table of Variables of Volume II be updated accordingly. Similarly, the page numbers attached to the statecharts, macros, functions, variables, and events names also must be updated.

Appendix A to Appendix E Page Numbers

DO185A continued the page numbering in the appendices from the main body. This practice is no longer compliant with the standard practice where page numbers restart from one for each appendix and is distinguished by an appendix number. Re-starting the page numbering also has the benefit of decoupling the appendices from the main body so that the appendices are insulated from future page number changes in the main body.

Appendix C, Event Definitions

The Sense_Reversal_Event (e-684) is shown as being received only by Reversal_Inhibit (s-209). It should also be shown as being received by Sense (s-219), where it triggers the change from Climb to Descend or Descend to Climb sense for both the single-threat scenario (Vol. 2 page 223) and the multi-aircraft scenario (Vol. 2, page 226).

The alphabetical ordering of the events is re-stored. The events table is re-paginated to evenly distribute the table rows in each page.

Appendix E, First Page

The label, “APPENDIX E”, is added to the top of first page in Appendix E, following the same practice in other appendices.

Editorial and Styling Changes – Regarding DO-185B Attachment A

Replacing "Mode S (discrete) address/ID" with "ICAO 24-bit aircraft address"

A case insensitive text search for key word, "mode s", identifies the following areas needing replacements:

1. Page 2-P2, STRUCTURE ITF, GROUP identity, INT IDINT definition

   From: Mode S discrete address
   To: ICAO 24-bit aircraft address

2. Page 2-P5, STRUCTURE TF, GROUP identity, INT ID definition

   From: Mode S discrete address
   To: ICAO 24-bit aircraft address

3. Page 2-P10, STRUCTURE G, GROUP resolution, INT IDOWN definition

   From: Mode S discrete address
   To: ICAO 24-bit aircraft address

4. Page 2-P12, STRUCTURE G, GROUP broadcast, INT ID definition

   From: Mode S identifier
   To: ICAO 24-bit aircraft address

5. Page 2-P13, STRUCTURE O, GROUP status, INT IDOWN definition

   From: Mode S discrete address
   To: ICAO 24-bit aircraft address

6. Page 2-P24, STRUCTURE RA_TO_TRANS, BITS TID(26) definition

   From: Mode S address
   To: ICAO 24-bit aircraft address

7. Page 3-P5, HIGH-LEVEL PROCESS Initialize, last line

   From: Mode S ID
   To: ICAO aircraft address

8. Page 3-P6, LOW-LEVEL PROCESS Initialize, last line

   From: Mode S ID
   To: ICAO aircraft address

9. Page 3-P13, TASK RECEIVE, STRUCTURE RCV_VAR, GROUP message, INT MID definition

From: Mode S ID
To: ICAO aircraft address

10. Page 3-P22, LOW-LEVEL PROCESS MODE_S_MESSAGE_PROCESSING, Line 8

    From: Mode S ID
    To: ICAO aircraft address

11. Page 3-P25, HIGH-LEVEL, PROCESS Periodic_data_processing, Lines 1, 14

    From: Mode S ID
    To: ICAO aircraft address

12. Page 3-P26, LOW-LEVEL, PROCESS Periodic_data_processing, Lines 1, 14

    From: Mode S ID
    To: ICAO aircraft address

13. Page 4-P7, HIGH-LEVEL, TASK TRACK_OWN, Lines 4-5

    From: Mode S discrete address
    To: ICAO aircraft address

14. Page 6-P11, HIGH-LEVEL, PROCESS New_threat_file_entry, Line 6

    From: Mode S ID
    To: ICAO aircraft address

15. Page 6-P13, HIGH-LEVEL, PROCESS Select_sense, Lines 1-2

    From: Mode S ID
    To: ICAO aircraft address

16. Page 6-P21, HIGH-LEVEL, PROCESS Reversal_check, Line 33

    From: Mode S ID
    To: ICAO aircraft address

17. Page 6-P23, HIGH-LEVEL, PROCESS Reversal_check, Line 9

    From: Mode S ID
    To: ICAO aircraft address

18. Page 9-P13, HIGH-LEVEL, PROCESS Optimize_with_simultaneous_threats, Lines 12-14

    From: Mode S ID
    To: ICAO aircraft address

19. Page 9-P15, HIGH-LEVEL, PROCESS Evaluate_simultaneous_threats, Line 3

    From: Mode S ID / ID
    To: ICAO aircraft address / address

20. Page 9-P37, HIGH-LEVEL, PROCESS Evaluate_reversal_with_TCAS_threat, Line 1

    From: Mode S ID
    To: ICAO aircraft address

21. Page 9-P39, HIGH-LEVEL, PROCESS Multiaircraft_processing_with_TCAS_threat, Lines 6, 14-15, 20

    From: Mode S ID
    To: ICAO aircraft address

22. Page 9-P41, HIGH-LEVEL, PROCESS Evaluate_with_TCAS_threat, Lines 1, 16

    From: Mode S ID
    To: ICAO aircraft address

23. Page 9-P67, HIGH-LEVEL, ROUTINE MULTIAIRCRAFT_LEVEL_OFF_MANEUVER, Lines 28, 38

    From: Mode S ID
    To: ICAO aircraft address

24. Page 9-P71, HIGH-LEVEL, ROUTINE MULTIAIRCRAFT_POSITIVE_MANEUVER, Line 19

    From: Mode S ID
    To: ICAO aircraft address

PROCESS Reversal_check, High-level, as amended by CP90, 3rd top-level IF, 3rd and 4th lines

The comments "<Sequence becomes …> and "<If reversal flag not set this cycle...>" should be indented to align with the immediately following nested IF statement.

PPROCESS Reversal_check, High-level, as amended by CP90, 3rd top-level IF, line 5

The nested IF expression beginning on this line does not have balanced parentheses. The Johns Hopkins University Applied Physics Laboratory electronic Version 7 baseline of 1 April 2005 fixes this problem by deleting one of the extra close parentheses, as was noted in the MIT Lincoln Laboratory verification report on that version, comment 2-1. This is in a region modified by CP112E, which fixes the problem in the other possible way, by adding an open parenthesis prior to "current RA is crossing". Either fix is acceptable. (This was initially documented as a comment on CP112E in issue paper IP-RWG-012, item 12.)

PROCESS Reversal_modeling, High-level

There should be a line at the beginning corresponding to the low-level pseudocode line "NOMINAL_SEP=0;". It should state something like "Default modeled separation for current RA is 0 if current RA is negative". (This was initially documented as a comment against CP112E in issue paper IP-RWG-008, item 2, and the suggested fix is shown as a changed line in the 12 May 2006 CP112E pseudocode baseline, although it is not directly related to CP112E.)

PROCESS Reversal_modeling, High-level, line 13

The line "Model separation achieved by continuing current RA;" should be aligned with the IF just above it and not with the statements under that IF's THEN branch, in order to match the low-level pseudocode. (This was initially documented as a comment against CP112E in issue paper IP-RWG-007, item 9. It was corrected in the subsequent CP112E baseline of 28 October 2005, but was not marked as a changed line. It then reverted to the erroneous Version 7 indentation in the latest, 12 May 2006, CP112E baseline. This was noted in IP-RWG-012, item 18, where it was also noted that this correction was not in any way related to CP112E, and so perhaps should be documented separately.)

PROCESS Multiaircraft_converging_check, High-level

The following indentation errors were introduced by JHU/APL during the update of DO185A with CP63 and uncovered by Kevin Wilson during the review of the draft DO185B distributed on 27 April 2007. The proposed fix is presented on pages B-1 and B-2 in Appendix B.

Page 8-P24, lines 22 and 28
Line 22, "CALL MODEL_SEP <Section 6>", and Line 28, "CONVERGE_SEP = MIN(absolute values of clm & des", should be aligned with Line 30, "SET current sense against current threat;".

Page 8-P25 lines 3 and 9

Line 3, "CALL MODEL_SEP <Section 6>", and Line 9, "CONVERGE_SEP = MIN(absolute values of clm & des", should be aligned with Line 11, "CLEAR current sense against current threat flag;"

Dates in the Header Sections

The dates in the header sections of DO185A reflect the dates last updated for individual pages. In the published MOPS, it is desirable to use a consistent revision date. The format "© 2007 November 2, RTCA, Inc. (DRAFT)" is used for the draft DO185B and will be updated once the draft is finalized.

Section 2 TCAS GLOBAL VARIABLES

The multi-page structure definitions are paginated unevenly and inconsistently, resulting in some pages with a large blank section and other pages overflowing. This section is re-formatted so that each new structure starts on a new page and are paginated evenly if there is overflow.

"STRUCT BRDCST_DATA" is added to Section 2's Table of Contents to reflect the new global variables added by CP35.

Section Numbers of DISPLAY and MULTIAIRCRAFT Logic

The DISPLAY logic is numbered Section 7b in DO185A, which has no particular relation to Section 7a "Traffic Advisory". Therefore, the Display logic is re-numbered Section 8 and the old Section 8, MULTIAIRCRAFT logic, is re-numbered Section 9.

Merging the Pseudocode Documents

DO185A documents the TCAS pseudocode in five separate documents:
(1) High level pseudocode
(2) Low level pseudocode
(3) Pseudocode Appendix A
(4) Pseudocode Appendix B
(5) Pseudocode Appendix C

It is desirable to merge these documents into one document to ease maintenance and improve readability, especially when the high level and low level pseudocode could be read side by side.

The pages are arranged and numbered so that the high level pseudocode are on the odd pages, low level pseudocode are on the even pages, and each appendix starts on an odd page. The appendices page numbers, prefixed with the appendix number, restart in each appendix.

Pseudocode modules that spill into the second page by three lines or fewer are re-formatted (by reducing the size of the blank lines or reducing the header and footer sections) to fit in one page.

In the Table of Contents for each section, the phrase "LOW-LEVEL" is removed.

The word "TASK" in the footer sections of TASK SEND_INITIAL_INTENT and TASK RECEIVE are removed in order to be consistent with the footer sections of other tasks.

Appendix A

The System Cross-Reference Table is re-formatted from tab delimited lines to a table with repeating header rows.

Appendix A

DO-185B Volume 1 Style Notes and Maintenance Guide
1 November 2007

David Spencer
MIT/LL

This document augments the RTCA "Basic Document Style Guide" with specific information about formatting and additional styles specific to DO-185B Volume 1. The format of DO-185B follows the RTCA style guide where that guidance applies. However it also includes formatting that goes beyond that specified in the style guide, and additional Microsoft Word styles and standard formatting have been designed for those purposes. Where appropriate, the document uses the Microsoft Word style names defined in the RTCA style guide, and the appearance of those styles is the same or similar to that called for in the style guide. However, the exact style definitions from the RTCA Microsoft Word template document that goes along with the RTCA style guide have not always been used.

Most of the remainder of this document lists the Microsoft Word styles used in DO-185B Volume 1 along with a description of how each is meant to be used. In some cases issues that can arise involving those styles are also discussed. The listing is divided into three groups according to the way Microsoft Word distinguishes different style types: character styles, used to determine the formatting of characters within a paragraph but not of the paragraph as a whole; paragraph styles, the most common style usage, which sets the formatting for a paragraph as a whole; and table styles, used to determine the formatting of tables, including borders and row or column headings. Within each group the styles of that type are listed alphabetically.

Following the lists of styles there are additional notes about the formatting of equations and a few miscellaneous other formatting conventions.

An attempt has been made to define styles in terms of the function that the text or paragraph or table performs in the document, and not simply in terms of their appearance. The style names reflect the intended function. This potentially allows changing the appearance of all text or paragraphs or tables that have a particular function (e.g., all figure or table references, which are presently underlined) without necessarily changing other items that have been given a similar appearance but serve a different function (e.g., underlined text used for emphasis). For this reason, there are in some cases several styles that generate the same appearance or formatting, although they are used for different functions.

There are also a few styles devoted to formatting for specific tables or paragraphs of the document, where the formatting used there is unlike other formatting in the document. One could perhaps avoid defining these additional styles by simply applying what Microsoft Word calls direct formatting to an existing style such as the basic Normal style

or to the style that is most similar to the desired appearance. Direct formatting is formatting that is applied directly to a selected item in order to override some aspect(s) of the style that has been applied to it (e.g., changing the bold/italic/underline setting, the indentation, the alignment, the spacing before or after the paragraph, the type of border, etc.) as opposed to modifying the style itself in order to cause an identical change in all items formatted with that style. However, if the style used for that paragraph is later redefined, that direct formatting may be removed when the style change is applied, or may not be, apparently depending on how much of the paragraph received direct formatting, according to expert sources on the Web [Refs. 1, 2]. In either case, one is left unsure of the result. By defining a specific style for these special cases one can be more certain of the effects of any style changes.

However, direct formatting has not been avoided altogether in the document, particularly in tables, where direct formatting has often been used to change the alignment of text within cells when the default alignment provided by the Table Text style and related styles was not appropriate. On the other hand, direct formatting of underlining has been avoided. Instead character styles have been defined specifically to indicate the function being performed by the underlining. It is hoped that this will ensure that underlining does not inadvertently disappear as a result of any redefinition of the underlying paragraph styles.

Character Styles

Character styles are used to format specific characters within a paragraph differently from the other characters within the paragraph. In DO-185B Vol. 1 they are used to underline text for various purposes and to define a different font appearance for DRAFT markings. By separating these purposes into different styles, it would be possible to change one of these to use, for example, italics, while leaving the other uses unchanged.

Defined Term – Used to underline a term or acronym that is being defined.

Draft Marking – Used to set the font style and size of "DRAFT" when it appears in a page header or footer so that it can be different (typically larger and/or bolded) from the appearance of the overall page header or footer paragraph style. Nominally, it is set to 14-point bold. This style can also be used to make all these markings disappear by changing the font definition for this style to Hidden (hidden text). This avoids having to edit the document to remove the draft markings, and also avoids the repagination that will result from removing "DRAFT". This repagination is due to the reduction in size of the headers and footers when the larger 14-point font is removed and the header reverts to 11-point spacing. Note that the draft marking on the cover page is not set to this style, as it is a different (larger) size, and it must be removed manually.

Emphasis – Used to underline text for purposes of emphasis. This is a Microsoft Word built-in style modified to get the desired appearance.

Figure/Table Reference – Used to underline references to figures and tables in the text and also in the figure or table titles, per the RTCA style guide.

Heading Emphasis – Used to underline text that is used as a heading. The heading may be either a standalone paragraph (although in most cases separate paragraph styles have been defined for that purpose) or may be an initial phrase at the beginning of a paragraph.

Note Emphasis – Used to underline the text "Note" that begins a note.

Paragraph Styles

Appendix Heading 1, Appendix Heading 2 – Used for the first- and second-level section headings for an appendix. The page break controls are set to ensure that these headings stay on the same page as the following paragraph.

Unlike Heading 1 through Heading 9 the definition of the appendix heading styles does not provide for automatic paragraph numbering (that is, they have NOT been defined as an outline-numbered style) although it would probably be possible to do that.

While it might be possible to automate the paragraph numbering process for appendices, that would still not allow the page numbering of the appendices to be of the form A-1, A-2, etc., as is often used in RTCA documents. Only the built-in Heading styles appear capable of interacting with the page numbering in that fashion. The recommendation from [Ref. 1] for how to include the appendix letter in the page numbering involves using only some of the Heading styles in the body of the document and using the remainder of the Heading styles for the appendix headings. However, DO-185B Vol. 1 uses all 9 of the Heading styles in the body of the document and so that approach is not possible. For this reason, and also because it seems to be considered the preferred approach by documentation experts [Ref. 1], the decision was made to continue the page numbering in the body of the document through the appendices. Another alternative would be to separate the appendices into a separate Word document, as they were for DO-185A. The appendices could then be numbered in any way desired, but would somehow have to be recombined with the body of the document in the Adobe Acrobat document used for distribution purposes.

In order to get the appendix titles and headings into the Table of Contents, since they are not formatted using Heading styles, the TOC must be created by selecting specific Word styles as identifying the paragraphs to appear in the TOC. In addition to Heading 1 through Heading 9, Appendix Heading 1, Appendix Heading 2 and Appendix Title must be selected. This can be accomplished through the optional parameter settings that can be selected when a Table of Contents is created. These settings do not need to be redone to update the TOC when the pagination changes. One only needs to select the TOC, right click to get a menu of options, select "Update the Field" and choose between updating only the page numbers and updating the entire TOC. The latter only needs to be selected if paragraphs formatted using one of the Heading, Appendix Heading or Appendix Title styles were added, removed or modified. Normally it should not be necessary to recreate the TOC from scratch, as the simpler field update function should meet all needs.

Appendix Title – Used only for the appendix titles. For the appendix titles to appear in the Table of Contents one must use the approach described under Appendix Heading 1 and Appendix Heading 2.

Code – Used only for the Pascal and C code in Appendix C. This style uses a fixed-width font to facilitate aligning lines of code so that the desired indentation is clearer.

Document Title – Used only for the document title on the front cover.

Figure Title – Used for the titles that appear below figures per the RTCA style guide. The definition of the Figure Title style assumes the figure fits between the normal RTCA 1-inch indentation for Paragraph style and the right margin, and is centered in that region. When figures occupy the full page width between the margins, direct formatting is used to move the left indentation for that Figure Title paragraph to the left margin so that the title is centered below the figure. In principle it would be possible to define a new style to accomplish this without direct formatting. However, the Table of Figures must be generated by using the option of listing the paragraphs with Figure Title style, rather than by selecting Captions of type Figure, as the Caption associations were either not created when the figure titles were created or else have been lost for all the figure titles. If another named style was used for some figure titles, those would not appear in the Table of Figures when it was created using the Figure Title style. A difficulty with the use of direct formatting in this manner is that if the Figure Title style is ever modified, this direct formatting will likely be lost and all the figure titles will revert to being centered on the Paragraph style.

Figure Title Continued – Used when a figure title contains a second explanatory line that should not appear in the Table of Figures. It is also used when a figure continues on the following page or pages and a continuation title is required for each such continuation page. Such continuation titles should not appear in the Table of Figures. The text of the continuation title is identical to that of the figure title except that "(cont.)" is appended. This style has not been split into separate margin-centered and paragraph-centered styles as the table title continuation styles have been. This is because there are very few (currently 4) figure title continuations. All but one are margin-centered and so the style was defined that way, with the one paragraph-centered title continuation being given a 1-inch indentation by direct formatting.

Front Matter Bullets – Used only for the bulleted list that appears in the Foreword (or potentially anywhere else in the front matter, where the text occupies the full space between the margins, unlike the main body of the document).

Front Matter Section Title – Used for the bold centered titles that appear before the various sections of the front matter (e.g., Foreword).

Front Matter Text – Used for the Forward and other front matter text that uses the full width of the page between the margins, as opposed to the 1-inch left indentation that is used in the main body of the document.

Heading 1 through Heading 9 – These are the built-in Microsoft Word heading styles, modified to appear as specified in the RTCA style guide. Heading 9 has been further modified slightly, as the paragraph numbering ran into the subparagraph title. For Heading 9 only, the subparagraph title is indented at 1.15 inches rather than the usual 1 inch (this is the "hanging" indentation setting).

Heading: Test Parameter Table – Used for the headings within the test parameter definitions in section 2.4 of DO-185B Vol. 1 (e.g., TCAS-Equipped Aircraft, Intruder Aircraft). The test parameter definitions all now appear within tables for formatting purposes, hence "test parameter table", but the tables are borderless and so invisible in the printed document. The page break controls for this style are set so that it will remain on the same page as the following line of the table, so that there will not be single heading lines at the bottom of a page.

Heading: Transponder Type-Specific Test – Used for the headings in section 2.4 of DO-185B Vol. 1 that separate the expected test output depending on the type of Mode S transponder being used. For example, "*When testing with an FAA TSO-C119A compatible Mode S transponder*:" This style is simply Paragraph style with italic font and with the page break controls set to ensure that the heading stays on the same page as the first line of the following output data table.

List 1. – This is the List 1. style as defined in the RTCA style guide. It is automatically numbered 1., 2., 3., etc. The numbers are indented 0.25 inches from the normal Paragraph indentation (1.25 inches overall), and the text is further indented 0.25 inches. This is used only as a second level of list numbering. Per the RTCA style guide, top-level lists should use the List a. style, and List 1. should be used only where another sub-list appears within a List a. item. (This constraint could be enforced by defining an outline-numbered style that encompassed both List a. and List 1., but that has not been done.)

List 1. Continued – Used where a List 1. item requires more than one paragraph. It indents the text appropriately for List 1. text but is not automatically numbered and does not have a hanging first line to accommodate the numbering.

List a. – This is the List a. style as defined in the RTCA style guide. It is automatically numbered a., b., c., etc. The letters are at the same indentation as Paragraph style (1 inch) and the text is indented 0.25 inches. This is used for top-level lists.

List a. Continued - Used where a List a. item requires more than one paragraph. It indents the text appropriately for List a. text but is not automatically numbered and does not have a hanging first line to accommodate the numbering.

List of Conditions – Used only in section 2.2.4.6.1.3.3.1 of DO-185B Vol. 1. A list of conditions a1, b1, c1, a2, b2 is defined there in a format that looks like a List a. list except for the unusual numbering. That odd numbering provides names for the conditions being defined there and those names are referred to in a following table. Automatic numbering is not appropriate for those paragraphs and so a special style was created. This style is based on the Lists style.

List of References – Used only for the References in section 1.10 of DO-185B Vol. 1, as these are numbered A., B., C., rather than a., b., c, as in the List a. style. It is based on the Lists style, but automatic numbering has been added to this style.

Lists - Defines a base style for lists, but one that does not define automatic numbering. It is not directly used for formatting any paragraphs in the document. Instead, some of the other list styles that are used to format paragraphs are based upon it. However, the Lists style has not been used as the base style for all list styles, although it probably could be. Automatic numbering should not be defined within the Lists base style because different list styles have different numbering formats and also because their list numbering restarts at different places in the document.

Normal, Normal Centered, Normal Right – The Normal style is a built-in Microsoft Word style. It defines the basic style upon which many other styles are based. It is used to set the font to Times New Roman 11 point. Normal is indented at the left margin and has no spacing before or after. The other two styles are the same except for being centered or right aligned. In addition to serving as the basis for other styles, these styles are used for various utility purposes in the document where it did not appear worthwhile defining new styles. They are often used where additional vertical spacing is needed. They are used in some tables where even the minimal spacing provided by Table Text Narrow Spacing is not desirable.

Note – This provides the formatting specified for notes in the RTCA style guide. The first line aligns with Paragraph-style text but is hanging by 0.5 inches to allow for "Note" followed by a tab to align the indented text. The text is italicized. In cases where a note has more than one paragraph, the paragraphs after the first just use a tab as their first character to tab to the text alignment (i.e., no special "Note Continued" style is needed). In cases where there are a series of numbered notes, the numbers are typed instead of "Note" and followed by a tab character to align the text. No special style was defined for these numbered notes. (Although there is a Note List 1. style it should not be used for that purpose.) However, this means that numbered notes are not automatically numbered.

The RTCA style guide does not specify nor show the "Note" heading at the beginning of the note as being underlined, but that is the style used in DO-185A and many other RTCA documents, and so has been continued in DO-185B. The Note Emphasis style is used for this purpose.

Note in a List a. List – Used when paragraphs in List a. style have notes contained within them. Those notes must be indented an additional 0.25 inches (1.5 inches total) so that "Note" aligns with the indented List a. text.

Note in a Table Cell – Used for notes contained in a table cell. The table cell provides appropriate alignment and no additional indentation is desired for the first line. However, a hanging first line is still used to indent the text of the note. The tab character needed after "Note:" to align the first line of the note text with the remaining lines must be entered as Control-tab, as a simple tab character in a table cell moves the cursor to the next table cell.

Note List 1. – Used when a second-level list is contained within a Note List a. list that in turn is contained within a note. This serves the same function as the List 1. style except it is indented at 1.75 inches, so that the numbers are indented 0.25 inches from the text of the encompassing note, and italicized. It is based on the Lists base style and is automatically numbered 1., 2., etc.

The Note List 1. style is NOT intended to be used for a numbered series of notes and should not be used for that purpose, as the indentation will be incorrect. Those are handled using the regular Note style as described above, and are not automatically numbered.

Note List a. – Used for a top-level list contained within a note. This serves the same function as the List a. style except indented at 1.5 inches to align the numbering with the indented text of a note, and italicized as appropriate to a note. It is based on the Lists base style, and is automatically numbered a., b., etc.

Page Footer Landscape Odd-Numbered – Used for the footer text of odd-numbered landscape-oriented pages. These pages have the RTCA copyright at the left margin of the footer, the page number at the right margin of the footer and a scribe line above the copyright and page number extending from the left to the right margin. The style provides the appropriate tab settings to align the text items as well as providing the scribe line. A centering tab is provided for DRAFT markings, if present. This arrangement puts the page number and copyright notice farthest from the binding and in approximately the same locations as for portrait-oriented pages, although the text is turned 90 degrees when the landscape-oriented pages are bound with the portrait-oriented pages. The header for these pages, the part of the page nearest the binding, is empty.

Page Footer Normal – Used to format the RTCA copyright notice in the page footers of portrait-oriented pages per the RTCA style guide. The notice appears at the left margin on even-numbered pages and at the right margin on odd-numbered pages. A right tab stop is provided at the right margin for the latter. A centering tab is provided to align DRAFT markings, if present.

Page Header Landscape Even-Numbered – This performs the same formatting for even-numbered landscape-oriented pages as Page Footer Landscape Odd-Numbered does for odd-numbered landscape-oriented pages. For even-numbered pages the RTCA copyright notice and page number are placed in the page header, with a scribe line below them. There is a centering tab for DRAFT markings, if present. The footer for these pages, the part of the page nearest the binding, is blank.

Page Header Normal – Used to format the page header text of portrait-oriented (normally oriented) pages. The headers for these pages have the page number at the left margin for even-numbered pages and at the right margin for odd-numbered pages. A right tab is provided at the right margin for the latter. There is a scribe line running below the page number from the left to the right margin. A centering tab is provided for aligning DRAFT markings, if present.

Paragraph – Used for the bulk of the body text in the document, as specified in the RTCA style guide. It is indented at 1 inch and the text is justified.

Paragraph Indented – Used when a paragraph needs to be further indented by 0.5 inches (1.5 inches total). However, in many circumstances where this style could be used, a borderless table of style Table: Untitled No Headings is used instead to obtain the desired indentation.

Sub-Heading – Used for underlined sub-headings in situations where one of the numbered Heading styles is not appropriate. For example, it is used to distinguish the different parts of a test description: "Test Scenarios", "Inputs", "Conditions", etc. It is like Paragraph style but underlined and with the page break controls set so that it will remain on the same page as the following paragraph in order to avoid solitary headings at the bottom of pages.

Table Footnotes – Used only for footnotes to Table 2-16 of DO-185B Vol. 1. It modifies the Normal font to be 9-point italic.

Table of Figures – This is a built-in Microsoft Word style used to format both the Table of Figures and the Table of Tables. It has been modified as necessary to give the desired appearance.

Table Text – Used for text contained in table cells. It is like Normal style except that it provides moderate spacing above and below the text so that the table does not appear too dense or difficult to read. Like Normal it is left aligned, but direct formatting is often applied to change the alignment to fit the needs of a particular table.

Table Text Bulleted in a Note – Used only within Table 2-23, which appears within a note, and so is italicized, and which has bulleted lists within some of its cells. (See further comments under Table Text in a Note.)

Table Text in a Note – Used when a table appears as part of a note. It is like Table Text style except that it is italicized. (Note: the approach in DO-185A, and continued in DO-185B, was to italicize tables that were referenced only by a note as if they were part of the note. One could make the opposite choice, treating these tables as text outside the note but referenced from within the note, and not italicize them. In that case the three styles in DO-185B Vol. 1 that are devoted to table text specialized to notes could be eliminated. That choice was made for the titles of such tables, so that they are not italicized and therefore do not appear italicized in the Table of Tables, as some of them did in DO-185A.)

Table Text in a Note Small Spacing – Like Table Text in a Note except with less spacing provided above and below the paragraph. Like Table Text Smaller Spacing except italicized. (See further comments under Table Text in a Note.)

Table Text Larger Spacing – Like Table Text style except additional spacing is provided above and below the paragraph. This style is used to give a more open look by providing extra white space.

Table Text Smaller Spacing – Like the Table Text style except that only minimal spacing is provided above the paragraph, in order to ensure that it does not come too close to any cell border that may be applied, and no spacing is provided below the paragraph. This is used for some smaller tables where there is no concern about

the table appearing too dense or hard to read, or else when it is desirable to ensure that a table fits on a single page or within some other space. (Where no additional spacing is desired, Normal style can be used.)

Table Title – Used for the table titles that appear above those tables that have titles, per the RTCA style guide. Its page break controls are set to ensure that it stays on the same page as the first line of the following table. The generation of the Table of Tables is based on finding paragraphs with this style, rather than on the use of Captions with the Table label, as any Caption styles that may have been applied during the creation of DO-185A have been lost. The definition of Table Title assumes the table is centered between the normal RTCA 1-inch indentation for Paragraph style and the right margin. When tables occupy the full page width between the margins, direct formatting is used to move the left indentation for that Table Title paragraph to the left margin so that the title is centered above the table. In principle it would be possible to define a new style to accomplish this without direct formatting. However, that would interfere with generating the Table of Tables by means of the Table Title style. If another named style was used for some table titles, those would not appear in the Table of Tables. A difficulty with the use of direct formatting in this manner is that if the Table Title style is ever modified, this direct formatting will likely be lost and all the table titles will revert to being centered on the Paragraph style.

Table Title Cont. Margin Centered, Table Title Cont. Paragraph Centered – Used when a table title contains a second explanatory line, or when a table continues on other pages and a continuation title is required. Such continuation titles should not appear in the Table of Tables. Table Title Cont. Paragraph Centered is identical to Table Title. Table Title Cont. Margin Centered differs only in that it is centered between the margins rather than being centered on Paragraph-style text. It is appropriate for tables that occupy the full page width. The use of two styles prevents inadvertently removing the direct formatting that would otherwise have to be used to appropriately center some of the continuation titles if only one table title continuation style was provided. The direct formatting would be removed if that style was redefined.

Whenever a table breaks between pages, the style of DO-185A, continued in DO-185B, requires a continuation title to appear at the top of each continuation page. The text of the continuation title is identical to that of the table title except that "(cont.)" is appended. Also, if the table has column-heading information in the first row or rows, this information is repeated at the top of each table continuation.

Microsoft Word provides mechanisms that automatically break tables as appropriate between pages, and that provide for specifying whether one or more initial rows should be repeated on each page as column headings. There are also mechanisms to specify whether or not individual rows may themselves be split between pages or whether the entire content of a row must appear on the same page. Finally, the normal paragraph page break controls may be applied to a table

row (or to the left-most cell in a row) to force it to appear together with the following row on the same page.

However, Word does not provide a mechanism for associating a continuation title with a table and printing that title at the top of each table continuation page. A mechanism to accomplish that was developed for DO-185A and has been continued in DO-185B. Each breaking table (smaller tables are kept on a single page by other pagination controls, and so are not affected by these considerations) is placed within its own document section by placing section breaks before and after the table. This is often necessary in any case because many of the long tables are in landscape format and section breaks are required in order to change the page format for just the section containing that table. The continuation titles are then placed in the page header (below the scribe line, when that appears in the page header) for both the even and odd page headers in the section containing the table.

An additional complication arises if the table and its title start at the top of a page. The procedure described so far would result in the continuation title appearing above the title on that page. To avoid this, the page setup or document layout (Windows vs. Mac) for that section is changed to specify “Different first page” in addition to the usual “Different odd and even”. The first page of the section will then have its own “First Page Header” that is different from the even and odd page headers. This first page header does not include the continuation title for the table, and looks like a normal even or odd page header, as appropriate.

This does create a difficulty, however, when text is inserted or removed from the document and the pagination changes. Since there is no concept of even and odd first page headers or first page footers, but the RTCA style guide requires different headers and footers depending on whether the page is even or odd, the appropriate header and footer style must be set manually depending on whether the section begins on an odd or even page. If editing causes the page number of that first page of the section to change from even to odd or vice versa, then the format of its first page header and first page footer must be manually changed. In practice this means that during the process of finalizing a version of the document for review or release, after going through the document to fix any bad page breaks, the page headers and footers must be manually scanned for all the first page headers and first page footers and their formatting changed if necessary.

Note that if the version of the document being printed contains tracked changes, then the pagination will be different depending on whether the printout is of the “Final Showing Markup”, which shows the deleted text, or the “Final”. This will affect page breaks as well as the issue above. It is recommended that the pagination assessments be made and that first page headers and footers be set with the control set to “Final” in such versions. That will show the appearance when the changes are finally accepted and the deletions are removed from the document.

TOC 1 through TOC 9 – These are the built-in Microsoft Word styles for the Table of Contents. They have been modified appropriately to give the desired appearance.

Whisper-Shout Figure Note – Used only for the notes within the whisper-shout tables in Figures 2-7 and 2-9. These figures use a combination of tables and small fixed-width font (Courier New, 9-point) to generate a diagram as well as a tabular representation of the whisper-shout sequences. This style differs from Whisper-Shout Figure Text in being italicized as appropriate for a note.

Whisper-Shout Figure Text – Used only in the whisper-shout tables in Figures 2-7 and 2-9. These figures use a combination of tables and small fixed-width font (Courier New, 9-point) to generate a diagram as well as a tabular representation of the whisper-shout sequences.

Table Styles

Table styles are used to create standard table formatting by controlling the borders and shadings used for tables. They can also be used to define a heading row or heading column that has special borders or shadings, has different text alignment, or different font modifiers such as bold or underlined. In principle they can be used to standardize other aspects of a table, but according to [Ref. 1] they are not well designed to reliably control all the aspects of table formatting that one might want to standardize, and therefore [Ref. 1] recommends against using them. However, for the purposes of DO-185B Vol. 1 they seem to do a reasonable job when used just for standardizing borders, shadings, and the appearance of heading rows or columns. They are not used for controlling the text that appears within table cells other than headings. That is done using Table Text and related styles.

Even for borders, shadings and heading control, table styles are not perfect, however, and if one of the table styles below is modified, it should not be assumed that all the corresponding tables are changed accordingly in all rows and columns. This is especially true since some of the tables in DO-185B are not rectangular, and some have multiple heading rows instead of a single heading row, as expected by the table style functions of Microsoft Word. It is necessary to manually verify the desired changes and make corrections where necessary.

Table: Titled with Column Headings – Used for most of the titled tables in DO-185B. This style has a double line with ¾-point spacing around the entire table and a similar double line between the last column-heading row and the first row of the table (and the first row on each page in cases where the table breaks between pages and the heading row is repeated at the top of the page). In addition, all cell borders internal to the table use a ¾-point single line. The text of the column headings is bolded and centered. No cells in the table have shading.

For some tables it was not desirable to force visible borders on all the internal cells by applying this style and then to have to remove some of them to make the tables appear as they were in DO-185A. For these tables, borders and shadings were applied manually (direct formatting) to match the description above except for those cell borders that are not visible in DO-185A. If Table: Titled with Column Headings style is later modified, those tables will need to be manually changed to match.

Similarly, some tables have multiple heading rows, which is apparently not within the capability of the Table Styles (although it is within the capability of the general Microsoft Word table capabilities). In some cases Table: Titled with Column Headings style was not applied to those tables (particularly when the table had to break across pages and all the heading rows had to repeat) and the borders and headings were formatted manually. In other cases the style was applied to the table and then the borders were manually edited so that the internal boundaries of the multiple heading rows were single lines and the boundary between the last heading row and the first table row was a double line.

Despite these complications, the use of table styles did allow all the tables to be rapidly converted to a standard style, and for that style to be quickly modified for all the tables at least once.

Table: Titled with Row Headings – Used only for Table 2-13 where the headings are row headings and appear in the first column. Similar to Table: Titled with Column Headings except that the double line appears between the first column and the remainder of the table rather than after the first row, and the entries in the first column are bolded and centered rather than the entries in the first row.

Table: Untitled No Headings – Used to align text where the desired alignment is not provided by one of the other styles listed here, particularly where the text is intended to have multiple columns or otherwise is to have a tabular or list-like appearance. The boundaries of the table cells are moved as appropriate to determine the alignment of the text. Where some items need to extend horizontally across more than one column, table cells can be merged to get the desired text arrangement. Similarly for items that need to extend vertically across several rows.

A primary use of this style is for test conditions and test parameter tables, but it is not restricted to that use and may be used to align any text where it is convenient to do so and one of the defined paragraph styles is not appropriate. Although the cell boundaries appear when viewed in Microsoft Word, this style has no visible borders or shadings. Therefore, when the document is printed all that is visible is the text contained within the table cells. By default this style indents the table so that the text in the leftmost column is indented 1.5 inches, or indented 0.5 inches from Paragraph style text, as that is the most common usage. However that indentation is modified by direct formatting using the Table Properties dialog when necessary.

Table: Untitled with Column Headings – Used for tabular data that is not given a table number and title, but which does have column headings. Identical to Table: Untitled No Headings except that a column-heading row is defined and styled as underlined and centered. There are no borders or shading applied, so only the table text is visible when the document is printed.

Equation Style

Where possible, equations have been formatted using Microsoft Equation Editor, a separately-installable component of Microsoft Word, using the font settings shown below. However, many equations in DO185A were inserted in the form of pictures that can not be edited by Microsoft Equation Editor, and these were not reformatted to fit this standard style due to lack of time. Also, where there was a group of equations that did not match this standard style and some were inserted as pictures and others as Equation Editor objects, none of them were changed, in order to keep a uniform style within the group.

Equation Editor Style	Font, Font Style
Text	Times New Roman, Regular
Function	Times New Roman, Regular
Variable	Times New Roman, Italic
Lower Case Greek	Symbol, Italic
Upper Case Greek	Symbol
Matrix-Vector	Times New Roman, Bold
Number	Times New Roman

When one uses Equation Editor, an additional "Math" type appears in the Style menu. Most elements of most equations are set to that style. When text is set to that style, Equation Editor automatically determines the type of each element of the equation and applies one of the styles above. This will typically result in TCAS-specific mathematical functions and text elements being classified as variables, and so italicized. (Equation Editor recognizes only the names of standard mathematical functions.) This must be corrected manually as necessary.

Equation Editor also has settings for the font size to be used for specific types of equation elements. For DO-185B Vol. 1 these are set as follows:

Type of Text	Font Size
Full (most equation elements)	11 point
Subscript/Superscript	7 point
Sub-Subscript/Superscript	5 point
Symbol (e.g., Σ for summations)	18 point
Sub-Symbol (e.g., Σ in a subscript/superscript)	12 point

The spacing settings, which determine how the various components of an equation are laid out, are left at the default Equation Editor settings.

Miscellaneous Style Items

Wherever the terms Mode A, Mode C or Mode S appear, the space between “Mode” and A, C or S is always a non-breaking space in order to keep the entire term together on a line.

For items of the form <id>=<number (or, symbol for a number)> where the id is a single short symbol (nominally 3 characters or fewer, although that is arbitrary and could vary) with no internal spaces, underlines or hyphens, then no spaces are used between the id and the equal sign, or between the equal sign and the following number or number symbol. This keeps these short equalities compact and ensures that they are not broken between lines. Examples are: t=2, T=nn, UF=16.

Citations of references of the form “Ref. x”, where x is one of the letters that identifies the references in subsection 1.10, have a non-breaking space between the period and the reference identifier.

Windows vs. Macintosh

The RTCA style guide calls for producing documents using Microsoft Word running on Microsoft Windows on a standard PC-type platform, although it references obsolete versions of all of these. DO-185B Volume 1 has been developed in Microsoft Word running on both PC and Apple Macintosh computers. However, the final assessment of things like page breaks, page numbering, and even vs. odd first page headers, as well as the creation of the Table of Contents, Table of Figures and Table of Tables, have all been done on a PC. The PC platform should continue to be used for those functions and the document should always be printed or converted to an Adobe Acrobat document (a form of printing) on a PC.

In one quick test it was found that pagination on a Macintosh did diverge from the pagination on a PC, although not for the first few hundred pages. The Times New Roman font appears to be formatted identically in both versions of Microsoft Word, and so for much of the document both versions produce the same pagination. In the case that was investigated, it was found that one of the tables late in the document just slightly overflowed the page when displayed on a Macintosh such that the table heading was reproduced on the next page but without any additional table rows. This then caused other features to move so that by the end of the document the two versions differed by two pages.

If for some reason it is desired to print the document or to convert it to Adobe Acrobat on a Macintosh, then the final assessment of things like page breaks, page numbering, and even vs. odd first page headers as well as the creation of the Table of Contents, Table of Figures and Table of Tables should also be done on a Macintosh in order to be sure that

the printed version has the same pagination as the version reviewed on the computer screen.

Occasionally, some document corruption (deletion of some figures, introduction of automatically-generated and unwanted character styles, changes to the styles of a few random paragraphs when an unused style is deleted) has been experienced when editing DO-185B Vol. 1 on a Macintosh. It is not known if these are problems with the Word implementation on the Mac, or with some internal corruption of the document itself due to its large size and long history. However, many fewer problems have come up when editing on a PC, and so that is the recommended approach.

References:

1. Microsoft Word Help by Shauna Kelly, http://www.shaunakelly.com/word/index.html and other online sources linked from that site.
2. The Word MVP Site, http://www.word.mvps.org/index.html.

Appendix B

Indentation Correction for High-Level PROCESS Multiaircraft_converging_check

```
PROCESS Multiaircraft_converging_check;

    CLEAR multiaircraft conflict flags for reversal possible and current sense against threat;

    REPEAT WHILE (more TF entries AND multiaircraft conflict reversals are possible);
        IF (own's sense against current threat is same as displayed RA)
            THEN IF (own's sense against a TF threat <TF.PERMTENT> equals own's sense against
                        current threat <OWNTENT> AND (TF threat is not the same as current threat))
                    THEN CALL DESCEND_INHIB_TEST
                            IN(own's sense against current threat)
                            OUT(flag indicating whether descend is inhibited);
                        IF (own too close to ground to descend)
                            THEN set own goal rate to zero;
                            ELSE  IF (own's sense against current threat is climb)
                                        THEN set own goal rate to greater of own tracked rate and
                                                nominal climb rate;
                                        ELSE  set own goal rate to lesser of own tracked rate and
                                                nominal descent rate;
                        CALL MODEL_SEP  <Section 6>
                            IN (pilot delay time between RAs, own goal rate, own tracked
                                altitude, own tracked rate, nominal acceleration, climb sense
                                , intruder altitude, intruder rate, ITF entry)
                            OUT (modeled climb separation against a maneuvering threat);
                        CALL MODEL_SEP <Section 6>
                            IN (pilot delay time between RAs, own goal rate, own tracked
                                altitude, own tracked rate, nominal acceleration, descend
                                sense, intruder altitude, intruder rate, ITF entry)
                            OUT (modeled descend separation against a maneuvering
                                    threat);
                        CONVERGE_SEP = MIN(absolute values of clm & des
                                    separations);
                        SET current sense against current threat;
                        CALL MULTIAIRCRAFT_CONVERGING_TEST
                            IN (modeling separation against a maneuver threat, current sense
                                    against threat, TF entry)
                            INOUT (own sense vs. current threat, ITF entry);
                        SET reversal possible flag;

            ELSE  IF (own's sense against a TF threat differs from own's sense against current threat
                        AND (TF threat is not the same as current threat))
                    THEN CALL MODEL_SEP  <Section 6>
```

```
                    IN (pilot delay time between RAs, own goal rate, own tracked
                        altitude, own tracked rate, nominal acceleration, climb

                       sense, intruder altitude, intruder rate, ITF entry)
                    OUT (modeled climb separation against a maneuvering threat);
                CALL MODEL_SEP <Section 6>
                    IN (pilot delay time between RAs, own goal rate, own tracked
                        altitude, own tracked rate, nominal acceleration, descend
                        sense, intruder altitude, intruder rate, ITF entry)
                    OUT (modeled descend separation against a maneuvering
                            threat);
                CONVERGE_SEP = MIN(absolute values of clm & des
                            separations);
                CLEAR current sense against current threat flag;
                CALL MULTIAIRCRAFT_CONVERGING_TEST
                    IN (modeling separation against a maneuvering threat, current sense
                        against threat flag, TF entry)
                    INOUT (own sense vs. current threat, ITF entry);
                SET reversal possible flag;
        Select next TF entry;
    ENDREPEAT;

END Multiaircraft_converging_check;
```